> would seem have been circumvented in some unexpected manner by the machinations of that arch-rebel Washington. Mr. Cavendish is scarcely interested, and he moves aside to catch something concerning, it may be, some fresh eccentricity of poor Lord George Gordon, or perhaps some account of the troubles of the unhappy Mr. Watt, the engineer, who, it is said, is fighting tooth and nail to defend his just rights from a set of unprincipled rogues who pirate his inventions. None of these matters is sufficiently moving to detain him. But his manner quickly alters when he overhears the mention of the name of Mr. Herschel. Mr. Herschel is a musician at Bath, who employs his leisure in constructing big telescopes, with one of which he has just discovered a new planet. Mr. Cavendish is greatly interested; he listens with marked attention; he is even about to put a question, and begins in a nervous, hesitating manner, and in a thin, shrill voice, when his eye catches that of a stranger; he is instantly silent, and retires in great haste, for he has a horror of a strange face. The portly gentleman with the large frill espies him, and comes up with a foreign gentleman, who is formally introduced to Mr. Cavendish. Mr. Cavendish is assured by the portly gentleman that his foreign friend is particularly anxious to make the acquaintance of a philosopher so profound and so universally celebrated—all of which is confirmed by the foreign gentleman, who adds that it was, indeed, his chief reason for coming to London, that he might see and converse with one of the most illustrious philosophers of that or any other age. Mr. Cavendish is speechless; he is overwhelmed with confusion, until seeing an opening in the crowd, he darts through it with all possible speed, and reaching his carriage, is driven home."

This it must be acknowledged is a most graphic piece of descriptive narration; it conveys the man and the age like a living picture. The author would have made a thrilling novel-writer, at all events on the descriptive side.

The sketch of Lavoisier, although giving a fair account of his life and works, possibly treats at too great a length of his tragic death; but this error (if it be one) is partly atoned for in the next essay, in which the rights (and wrongs) of the dispute regarding the share of Priestley, Cavendish and Lavoisier in the discovery of the nature of combustion and of the composition of water are fully discussed. No English chemist will dispute that while Priestley and Cavendish, personally, and through Blagden, furnished Lavoisier with the facts relating to the preparation of oxygen and the composition of water, it was Lavoisier who interpreted them correctly. It is strange that Priestley (in a passage quoted on p. 153) and Cavendish, in his paper in the *Phil. Trans.* for 1784, p. 150, both consider the advantages and disadvantages of using the conceptions given to the world by Lavoisier; and both, after stating arguments on both sides, prefer the method of statement in terms of phlogiston. It is a pity that such international disputes should arise; would that scientific men of all nations would take to heart the words of Pasteur:—

> "I find myself deeply impressed by two propositions: first, that science is of no nationality; and secondly, in apparent but only apparent contradiction, that science is the highest personification of nationality. Science has no nationality, because knowledge is the patrimony of humanity, the torch which gives light to the world. Science should be the highest personification of nationality, because, of all nations, that one will be the foremost which shall be the first to progress by exerting thought and intelligence. Let us strive, for strife is effort, strife is life, when progress is the goal."

The strife should consist in trying to raise one's own nation to the highest pinnacle of intellectual and industrial greatness, and not in disputes as to priority of discovery and invention.

A full analysis is given of Graham's work, and his biography is pleasant reading. The genial, kindly nature of the man is well brought out. The remaining essays, on Wöhler and Liebig, founded on Hoffmann's charming biography; of Kopp and of Victor Meyer, both old friends; and of Mendeléeff and Cannizzaro, enter more into the details of their chemical work, and may therefore prove of less interest to the general reader; but they are fairly exhaustive, and produce the effect which they were intended to produce—a high estimate of the genius and hard work of the subjects of biography.

The progress of chemistry in this country during the nineteenth century was the subject of Dr. Thorpe's presidential address to the Chemical Society in 1900; it is conceived in his best style, and presents a life-like picture of the progress of the science in the early part of the century. A continuation of this sketch is promised, but up to now has not appeared. But it is acknowledged to be easier to paint a distant landscape than a near one; the numberless details, which produce somewhat of confusion when close, merge into broad masses of colour when sufficiently far away.

One conclusion, among many, stands out conspicuous from Dr. Thorpe's pages. It is the enormous influence of the teacher on the taught; how potent is the effect of personal contact with the experienced investigator on the future career of the young student! Scheele with Retzius and Bergmann, Watt with Black, Lavoisier with Rouelle, Faraday with Davy, Graham with Thomson, Wöhler with Gmelin and Berzelius, Liebig with Gay-Lussac, Dumas with De Saussure and De Candolle, Kopp with Gmelin, Victor Meyer with Bunsen. It is rare that a young man has, like Boyle and Cavendish, sufficient initiative and perseverance to forge a way for himself. As Prof. von Baeyer once remarked to the writer of this notice:—"I care not what a young man knows; if he can only *think*, after he has left my laboratory, I feel that I have done my duty by him." When will this elementary view of education influence the action of those who legislate on the training of our youth?

W. R.

AN ASSISTANT MASTER, AND HIS WORK.

The Schoolmaster: a Commentary upon the Aims and Methods of an Assistant Master in a Public School. By Arthur Christopher Benson, of Eton College. Pp. vi + 173. (London: John Murray, 1902.) Price 5*s.* net.

THIS book is not, and does not profess to be, a manual of pedagogy. The reader in search of help in regard to school organisation, to the allocation of time and subjects, to the methods of teaching generally, the bearing of Herbartian or other philosophical theories on practical problems, or educational politics in any sense, will probably find the book disappointing. The author has little or nothing to say on the relation of

Government or public authorities to the school and its teachers, the influence of external examinations, the place of science in the curriculum of a school, the professional training of school masters, or any of the numerous subjects which form the staple of newspaper controversy or Royal Commissioners' reports in relation to school policy and work. His point of view is simply that of a classical master, whose work has been done only with scholars drawn from the upper ranks of society, whose educational ideals have been formed by Eton traditions and by the requirements of the universities, and who discusses with his readers in an informal and conversational fashion the question how, under the exceptional conditions of a boarding-house at a great public school, the utmost can be done to foster manliness, good scholarship and the characteristics of a Christian gentleman.

But within this limited range of observation and experience Mr. Benson has acquired much valuable knowledge, and his book shows him to be distinguished, not only by literary skill, but also by a genuine love for his profession and by a keen and sympathetic insight into the nature and the needs of boyhood. His view of the spiritual and mental relationship which should be established between a wise teacher and his pupil, his large tolerance for differences in the character and tastes, the virtues and the faults of boys, his belief in Thring's well-known *dictum* that there is no such thing in the world as a good-for-nothing boy, and his insistence on the value of an atmosphere of cheerfulness and intelligence as distinguished from the mere learning of lessons —all give a special charm to the book and will serve to make it peculiarly attractive to young teachers who are not pedants, but who seek to achieve the highest and truest kind of professional success.

The discussion on the prospects of the teaching profession and its disadvantages is marked by much candour:

> "No enthusiasm will ever quite succeed in gilding a trade which consists in part of providing food and lodging for a large number of people and charging them rather more than they cost."

On the other hand, to one who is drawn to the profession by a sense of personal fitness and by a liking for the work,

> "there is a certain attractiveness about the perpetual exercise of minute control, there is a sense very strong in the British character of pleasure in exercising discipline and showing power"; "there is no profession which is so apt, if exercised faithfully, sympathetically and tenderly, to broaden the character and enlarge the spirit,"

and it often happens that the man who begins as the careless, self-regarding practitioner of a not very dignified

> "trade discovers that he is in the thick of a very real and vivid life which stirs all sorts of interests and emotions and brings home to him some of the deep realities of life."

The writer of such passages is under no illusions and has no temptation to magnify his office unduly; but he is deeply impressed with its seriousness, and he believes that a young teacher will find, as he acquires new power and stronger sympathy, increased delight in his work. As to specific training for that work, Mr. Benson is somewhat sceptical. Apparently he is not speaking from any experience of trained as compared with untrained colleagues: but because his own success has been attained by other means than formal preparation, he pronounces boldly that training can never make a man an effective teacher. He thinks that

> "a sensible man may learn more in a week from teaching a division of his own when he has no one to depend on but himself than in months spent in a training college."

His plan appears to be to treat a class of boys as the *corpus vile* on whom pedagogic experiments may be tried, and he adds with charming *naiveté*,

> "As far as mere methods are concerned, I am sure I could tell a young man in half an hour the simple dodges which have proved in my own case useful and effective."

The author fails to see that while a man endowed with natural gifts such as insight into character and professional enthusiasm may become a valuable teacher without training, it is evident that the rank and file of the teaching profession will find themselves at least helped by some knowledge of the philosophy of the art they profess and by some acquaintance with the methods and performances of famous teachers, and of the reasons for their success or failure.

The best chapters in the book are those in which the author discusses the means by which school lessons may be made interesting and attractive to boys.

> "A school lesson," he says, "should be of the nature of a dramatic performance from which some interest and amusement may be expected, while at the same time there must be solid and business-like work done. The aim ought not to be to turn everybody into a literary personage. Literature is only one province of the intellectual life. . . . An intellectual person is one whose mind is alive to ideas, who is interested in politics, religion, science, history, literature, who knows enough to wish to know more and to listen if he cannot talk."

But no man is capable of generating in his pupils a real love for knowledge unless he himself cultivates some intellectual interests apart from the obvious routine of school work.

> "The master, out of school, should live in the company of good books and big ideas. Everyone cannot be interested in everything, but everyone is capable of being interested in something, and I do not care very much what the subject is, provided only that there is a little glow, a little enthusiasm in it."

On the well-worn topics of athletics, on holidays, on prizes, on the right use of chapel services and on moral teaching, Mr. Benson speaks with strong conviction and good sense. His aims are high, but he is afraid to set up impossible ideals or to forget that, while temptation is often strong and boys are weak, they

> "are in their better moments earnestly and pathetically desirous to be kept from evil, and that no help which the schoolmaster can give them is ever thrown away."

The book abounds with obvious truisms, but they are rendered attractive by the freshness with which they are stated, and by the fact that they are the product of actual experience and of the serious devotion of a life to duties which the author has learned to enjoy as well as to fulfil. In the midst of much that he and others regard as revolutionary in educational theory, and of many importunate claims on the part of "modern subjects" in schools, it is useful for us all to be reminded, as in this book, of what may be done in connection with the traditional discipline of the great public schools, when the work is undertaken by men who, though standing honestly *super vias antiquas* in regard to the staple of school teaching, are nevertheless profoundly conscious of the needs of our own time, and who look on scholarship, not as an end in itself, but mainly as a means to the higher end of Christian manhood and honourable citizenship.

OUR BOOK SHELF.

The Dictionary of Photography. By E. J. Wall, F.R.P.S. Revised and brought up to date by T. Bolas, F.C.S., F.I.C. 8th edition. Pp. iv + 656. (London: Hazell, Watson and Viney, Ltd., 1902.) Price 7*s.* 6*d.* net.

THE fact that the eighth edition of this dictionary is now published is the best of all evidence of the appreciation that it continues to receive. And this appreciation is deserved, whether one regards the work of the author or the reviser. So far as we have been able to examine the work, the information it gives is sound and useful. Mr. Bolas states that he has added nearly a hundred new pages of subject-matter, as many fresh headings and many new diagrams, but by a process of concentration and elimination has not increased the bulk of the volume so far as to render it unwieldy.

The great difficulty in compiling a book that aims at being something more than a simple guide for beginners and something more handy and less costly than a treatise that aims at approximate completeness, is to satisfactorily apportion the available space to the various subjects. As the needs of no two readers are exactly alike, a very wide margin must be allowed for the discretion of the compiler, but we notice a few cases in which the reviser might with advantage have extended his work of adding to the original, even if it necessitated still more "concentration and elimination." The page and a third devoted to "amphitype," for example, might well have been spared, while the six or seven lines devoted to "hypo-eliminators" might profitably have been expanded to a couple of pages. The getting rid of sodium hyposulphite is a problem that has to be attended to in the production of every negative and silver print, and even if all "eliminators" are regarded as useless, some are still on the market, and every thinking photographer wants to know something as to their mode of action, advantages and drawbacks.

Acetylene is very unfairly treated. After it has been in use for so many years as it has, and has proved to be so convenient, effective and safe, it must be a prejudiced view of it that leads to its consideration in less than a page, half of which is devoted to its endothermic and consequently supposed dangerous character, and the other half to its history and a statement that the "great hopes" concerning it have not been realised!

In the selected bibliography of photography some hundred and twenty books are mentioned, ranging from apparatus makers' pamphlets and beginners' guides to the most comprehensive works; but of the few books recommended for students by the City and Guilds examiners, presumably because of their educational value, we have counted nine in English, including three on general photography, that are not mentioned. This difference can hardly be dismissed as due to the exercise of a wise discretion.

These are examples of the cases in which the reviser might have gone even further than he has in his additions, concentrations and eliminations. Doubtless he will do so when the next edition is called for.

Die Entwicklung des Gesichtes: Tafeln zur Entwicklungsgeschichte der aeusseren Koerperform der Wirbelthiere. By Carl Rabl. Part i., *Das Gesicht der Saeugethiere.* With 8 plates. (Leipzig: Engelmann, 1902.) Price 12*s.*

THIS, the first of four parts of a comprehensive work, deals with the development of the external form of the head-region in rabbit, pig and human embryo. How many different vertebrate animals the author proposes to make use of for the purposes of the research is not stated, but it may be recognised that the net is cast widely enough when within its meshes so lowly an animal as the lamprey is to be contained. The figures of the eight folio plates, drawn by the author, are certainly exquisite, quite unique, indeed, of their kind. From others previously published they differ in two important respects. While the former rarely exceed a magnification of five diameters, the present ones possess three times this, and —a very important point—they are the first series of the kind to be lithographed by the firm of Werner and Winter. This is a sufficient guarantee that full justice has been done to the originals by the lithographer's art.

In fundamental features the drawings, perhaps, hardly reveal anything not already visible in the well-known pictures of pig and human embryos published by His and Keibel. Possibly novelties may be looked for in subsequent parts of the work. To the figures extant of normal human embryos, those here given will form additions welcome to the anatomist and the embryologist alike. As to the others, the one noticeable deficiency is that they stop short of and do not at all cover the period when, for instance, the pig-embryo first becomes unmistakably a member of the genus Sus, a representative of the species *Sus scrofa*, and a pig with a particular individuality of its own. That is to say, the author ignores what His has termed the period of the passage of the embryo into the fœtus, the point when the unfolding of the embryo is about finished.

The work, which with so large a number of fine plates is remarkably cheap, is being published by the aid of the Imperial Academy of Sciences, Vienna.

Les Fleurs du Midi. By P. Granger. Pp. viii + 371. (Paris: J. B. Baillière et Fils, 1902.)

THE vast quantity of early flowers which reaches this country in the early spring from the Mediterranean region might lead one to suppose that the conditions of the climate there are entirely favourable to the forcing and rapid development of plants. A perusal of this book indicates that the gardeners of the littoral do not find circumstances by any means so propitious, for the east wind causes drooping of the leaves and withering of the flowers, while the mistral coming from the north-west at times blows with such force that trees are uprooted and shelters overthrown.

The various protective devices, whether hedges or trees, glass frames, straw mats, &c., are fully described and illustrated, together with the conditions under which they may advantageously be employed. Then follows a discussion of various details, such as manures, insecticides, the best methods of gathering and packing, and the cost of freight. The main bulk of the book treats of the plants which lend themselves to cultivation during the winter, with an enumeration of species and varieties which are suitable to the climate and likely to yield a remunerative return for time and money expended in their production. The book is essentially practical and represents the outcome of several years' experience. The